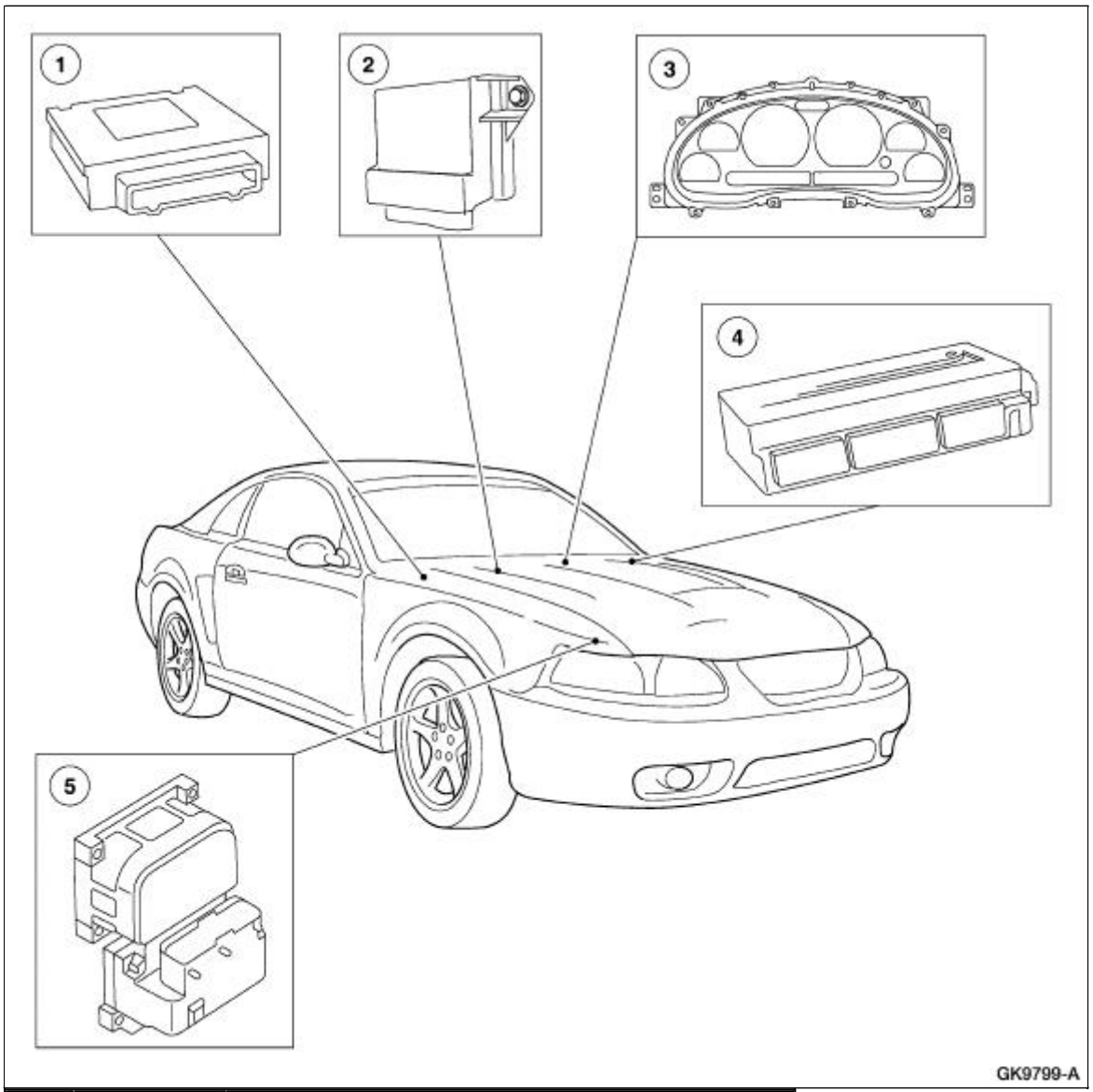
General Specifications

Item	Specification
Heat shrink tube overlap mm (inch)	12.7 (0.5)
Wire insulation removal length (twist side) mm (inch)	37.2 (1.5)
Wire insulation removal length (receiving side) mm (inch)	19.5 (0.75)
Raychem SCT® Heat Shrink Tubing, Motorcraft part number WT-5627	ESB-M99D56-A2

Communications Network

Module Communications Network



Item	Part Number	Description
1	12A650	Powertrain Control Module (PCM)
2	—	Restraint Control Module (RCM)
3	10849	Hybrid Electronic Cluster (HEC)
4	14B205	Generic Electronic Module (GEM)
5	2C219	Anti-Lock Brake System / Traction Control (ABS/TC) Module

Communications Network

Refer to Wiring Diagrams Cell 14 , Multiplex Communication Network for schematic and connector information.

Special Tool(s)

ST1137-A	73 Digital Multimeter or equivalent 105-R0051
ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent diagnostic tool

Principles of Operation

The vehicle has two module communications networks. The standard corporate protocol (SCP) which is an unshielded twisted pair cable (data bus plus, Circuit 914 [TN/OG] and data bus minus, Circuit 915 [PK/LB]), and the international standards organization (ISO) 9141 network which is a single wire (Circuit 70 [LB/WH]). The diagnostic tool can connect to both networks through the data link connector (DLC). This makes diagnosis and testing of these systems easier by allowing one smart tester to be able to diagnose and control any module on the two networks from one connector. The DLC can be found under the instrument panel between the steering column and the radio.

The ISO 9141 communication network does not permit inter-module communication. When the diagnostic tool communicates to modules on the ISO 9141 communication network, the diagnostic tool must ask for all information; the modules cannot initiate communications.

The SCP network will remain operational even with the severing of one of the bus wires. Communications will also continue if one of the bus wires is shorted to ground or battery positive voltage (B+) or if some, but not all, termination resistors are lost.

Unlike the SCP communication network, the ISO 9141 communication network will not function if the wire is shorted to chassis ground or battery positive voltage (B+). Also, if one of the modules on the ISO 9141 network loses power or shorts internally, communications to that module will fail.

The powertrain control module (PCM) is on the SCP communication network. The PCM controls the engine for better fuel economy, emissions control, and failure mode detection and storage. Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual Section 3 for diagnosis and testing of the PCM.

The restraint control module (RCM) is on the ISO 9141 network. The RCM controls the deployment of the air bags based on sensor input. For additional information, refer to Section 501-20B .

The generic electronic module (GEM) is on the ISO 9141 network. The GEM module controls a variety of systems including one touch down windows, wipers, perimeter anti-theft, and warning chimes. For additional information, refer to Section 419-10 .

The anti-lock brake control module communicates over the ISO 9141 communication network when not equipped with traction control and communicates over the SCP communication network when it is equipped with the traction control option. The anti-lock brake control module controls the brake pressure to the four wheels to keep the vehicle under control while braking. For additional information on anti-lock brake control module without traction control, refer to Section 206-09A . For additional information on anti-lock brake control module with traction control, refer to Section 206-09B .

The instrument cluster is on the SCP communication network. The instrument cluster displays driver information. The instrument cluster incorporates the PATS control module functions. For additional information on the PATS system, refer to Section 419-01 . For additional information on the instrument cluster, refer to Section 413-01 .

Inspection and Verification

1. Verify the customer concern.

2. Visually inspect for obvious signs of electrical damage.

Visual Inspection Chart

Electrical
• Central junction box (CJB) Fuse 31 (5A) • Damaged wiring harness • Loose or corroded connections • Anti-lock brake control module without traction control (optional) • Anti-lock brake control module with traction control (optional) • Generic electronic module (GEM) • Restraint control module (RCM) • Powertrain control module (PCM) • Instrument cluster

3. If the concern remains after the inspection, connect diagnostic tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from diagnostic tool menu. If diagnostic tool does not communicate with the vehicle:
    - check that the program card is correctly installed.
    - check that the correct version of the program card is installed.
    - check the connections to the vehicle.
    - check the ignition switch position.

If the diagnostic tool still does not communicate with the vehicle, go to Pinpoint Test H.

4. Go to Pinpoint Test PC.

System Precheck

PINPOINT TEST PC: DATA LINK DIAGNOSTICS NETWORK TEST

Test Step	Result / Action to Take
PC1 DATA LINK DIAGNOSTICS NETWORK TEST	
• Run the Data Link Diagnostics Network Test. • **Is SYSTEM PASSED obtained?**	**Yes** Test PASSED. RETURN to the Symptom Chart of the section for the module in question. **No** If no response from the diagnostic tool, GO to Pinpoint Test H . If CKT70=ALL ECUS NO RESP / NOT EQUIP, GO to Pinpoint Test F . If CKT914 or CKT915=ALL ECUS NO RESP / NOT EQUIP, GO to Pinpoint Test G . If CKT70, CKT914, or CKT915=SOME ECUS NO RESP/NOT EQUIP, REFER to Symptom Chart. If the module in question is NO RESPONSE ON CKT914 (BUS+), or NO RESPONSE ON CKT915 (BUS-), REFER to Symptom Chart. If the module in question is NO RESPONSE/NOT EQUIPPED, REFER to Symptom Chart.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The module does not respond to the diagnostic tool — anti-lock brake control module	• Wire or connection in SCP communication network (with traction control). • Wire or connection in ISO 9141 communication network (without traction control). • Anti-lock brake control module without traction control (optional). • Anti-lock brake control module with traction control (optional).	• GO to Pinpoint Test A .
• The module does not respond to the diagnostic tool — generic electronic module (GEM)	• Wire or connection in ISO 9141 communication network. • GEM.	• GO to Pinpoint Test B .
• The module does not respond to the diagnostic tool — restraint control module (RCM)	• Wire or connection in ISO 9141 communication network. • RCM.	• GO to Pinpoint Test C .
• The module does not respond to the diagnostic	• Wire or connection in SCP communication network.	• GO to Pinpoint

tool — instrument cluster	• Instrument cluster.	Test D .
• The module does not respond to the diagnostic tool — powertrain control module (PCM)	• Wire or connection in SCP communication network. • PCM.	• GO to Pinpoint Test E .
• No module/network communication — ISO 9141 network	• Wire or connection in ISO 9141 communication network. • ISO 9141 networked modules.	• GO to Pinpoint Test F .
• No module/network communication — SCP network	• Wire or connection in SCP communication network. • SCP networked modules.	• GO to Pinpoint Test G .
• No module/network communication — no power to the diagnostic tool	• CJB Fuse 31 (5A). • DLC pins. • Scan tool. • Circuitry.	• GO to Pinpoint Test H .

Pinpoint Tests

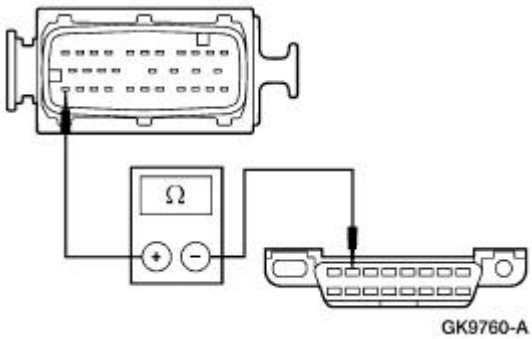
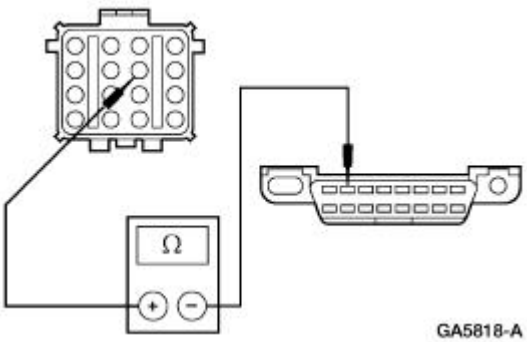
CAUTION: Be careful when probing the CJB, battery junction box (BJB) or any connectors. Damage will result to the connector receptacle if the probe or terminal being used is too large.

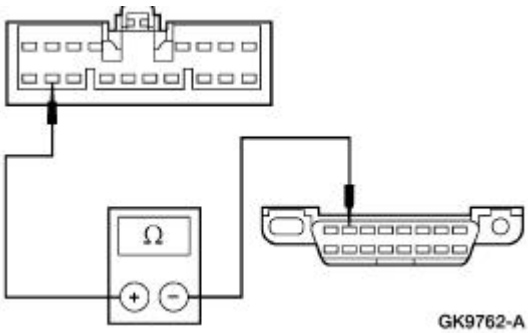
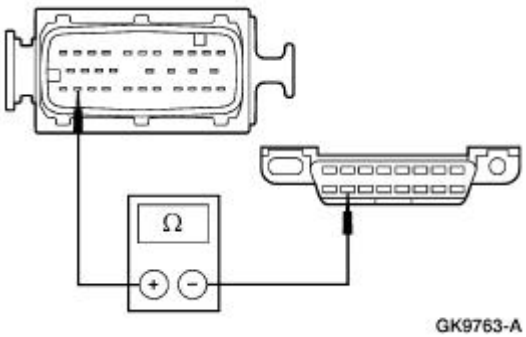
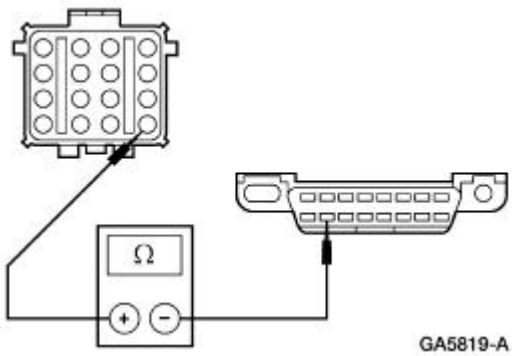
CAUTION: Electronic modules are sensitive to static electrical charges. If exposed to these charges, damage may result.

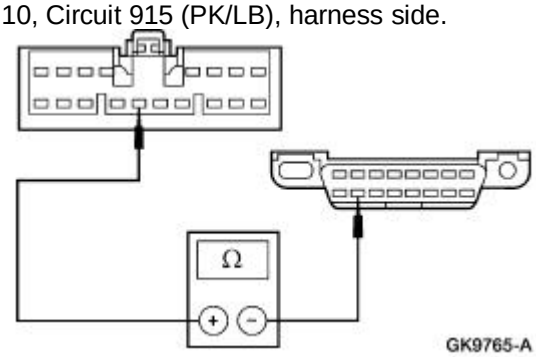
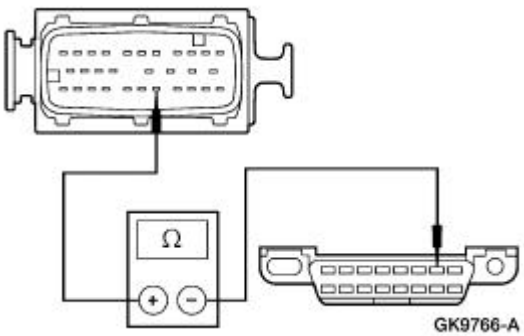
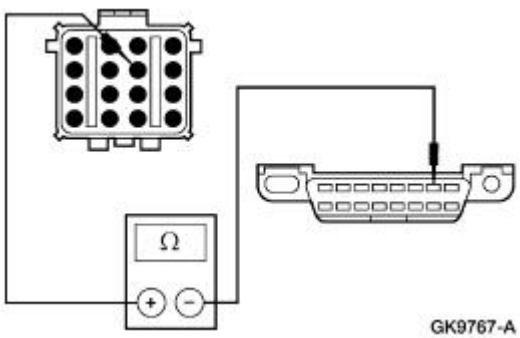
NOTE: If DTCs are recorded and the symptom is not present when carrying out the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded pins.

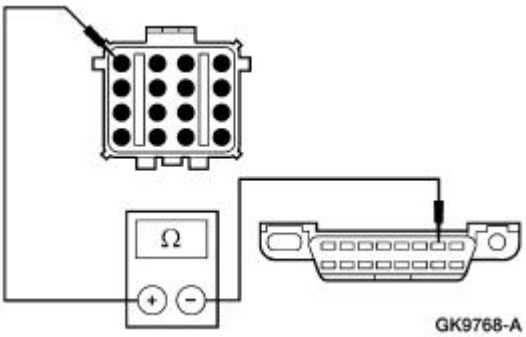
PINPOINT TEST A: THE MODULE DOES NOT RESPOND TO THE DIAGNOSTIC TOOL — ANTI-LOCK BRAKE CONTROL MODULE

Test Step	Result / Action to Take
A1 CHECK THE VEHICLE FOR TRACTION CONTROL	
• Check the vehicle for a traction control disable switch. • **Is a traction control disable switch present?**	**Yes** GO to A2 . **No** GO to A9 .
A2 CHECK ANTI-LOCK BRAKE CONTROL MODULE C141 FOR DAMAGE	
• Key in OFF position. • Disconnect: Anti-Lock Brake Control Module C135. • Inspect the anti-lock brake control module C135 for damage; repair as necessary. • Connect: Anti-Lock Brake Control Module C135. • Connect the diagnostic tool. • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: Diagnostic Data Link.	**Yes** GO to A3 . **No** GO to A6 .

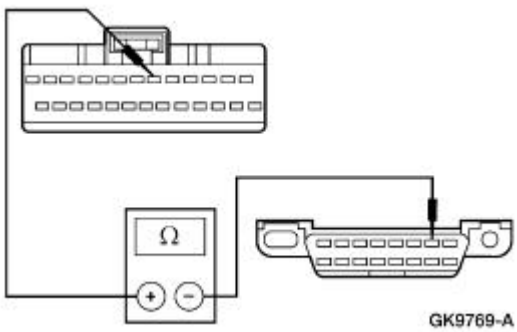
• **Was the result retrieved ABS: NO RESPONSE ON CKT914 (BUS+)?**	
A3 CHECK FOR OPEN BETWEEN DLC C251 AND ANTI-LOCK BRAKE CONTROL MODULE C135 — CIRCUIT 914 (TN/OG)	
• Key in OFF position. • Disconnect the diagnostic tool. • Disconnect: Anti-Lock Brake Control Module C135. • Measure the resistance between anti-lock brake control module C135 Pin 30, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new anti-lock brake control module. REFER to Section 206-09B . TEST the system for normal operation. **No** GO to A4 .
A4 CHECK CIRCUIT 914 (TN/OG) BETWEEN DLC C251 AND IN-LINE C144 FOR OPEN	
• Disconnect: In-Line C144. • Check in-line C144 for damage; repair as necessary. • Measure the resistance between in-line C144 Pin 6, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** REPAIR Circuit 914 (TN/OG) between anti-lock brake control module C135 and in-line C144. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. **No** GO to A5 .
A5 CHECK CIRCUIT 914 (TN/OG) BETWEEN DLC C251 AND IN-LINE C215 FOR OPEN	
• Disconnect: In-Line C215. • Check in-line C215 for damage; repair as necessary. • Measure the resistance between in-line C215 Pin 10, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.	**Yes** REPAIR Circuit 914 (TN/OG) between in-line C144 and in-line C215. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. **No** REPAIR Circuit 914 (TN/OG) between DLC C251 and in-line C215. For additional

 ● **Is the resistance less than 5 ohms?**	information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.
A6 CHECK FOR OPEN BETWEEN DLC C251 AND ANTI-LOCK BRAKE CONTROL MODULE C135 — CIRCUIT 915 (PK/LB)	
● Key in OFF position. ● Disconnect the diagnostic tool. ● Measure the resistance between anti-lock brake control module C135 Pin 29, Circuit 915 (PK/LB), harness side and DLC C251 Pin 10, Circuit 915 (PK/LB), harness side.  ● **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new anti-lock brake control module. REFER to Section 206-09B . TEST the system for normal operation. **No** GO to A7 .
A7 CHECK CIRCUIT 915 (PK/LB) BETWEEN DLC C251 AND IN-LINE C144 FOR OPEN	
● Disconnect: In-Line C144. ● Check in-line C144 for damage; repair as necessary. ● Measure the resistance between in-line C144 Pin 13, Circuit 915 (PK/LB), harness side and DLC C251 Pin 10, Circuit 915 (PK/LB), harness side.  ● **Is the resistance less than 5 ohms?**	**Yes** REPAIR Circuit 915 (PK/LB) between anti-lock brake control module C135 and in-line C144. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. **No** GO to A8 .
A8 CHECK CIRCUIT 915 (PK/LB) BETWEEN DLC C251 AND IN-LINE C215 FOR OPEN	
● Disconnect: In-Line C215. ● Check in-line C215 for damage; repair as necessary. ● Measure the resistance between in-line C215 Pin 13, Circuit 915 (PK/LB), harness side and DLC C251 Pin	**Yes** REPAIR Circuit 915 (PK/LB) between in-line C144 and in-line C215. For additional

10, Circuit 915 (PK/LB), harness side.  ● **Is the resistance less than 5 ohms?**	information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. **No** REPAIR Circuit 915 (PK/LB) between DLC C251 and in-line C215. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.
A9 CHECK FOR OPEN BETWEEN THE DLC C251 AND ANTI-LOCK BRAKE CONTROL MODULE C135 — CIRCUIT 70 (LB/WH)	
● Key in OFF position. ● Disconnect: Anti-Lock Brake Control Module C135. ● Inspect anti-lock brake control module C135 for damage, repair as necessary. ● Measure the resistance between anti-lock brake control module C135 Pin 24, Circuit 70 (LB/WH), harness side and DLC C251 Pin 7, Circuit 70 (LB/WH), harness side.  ● **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new anti-lock brake control module. REFER to Section 206-09A . TEST the system for normal operation. **No** GO to A10 .
A10 CHECK FOR OPEN BETWEEN THE DLC C251 AND IN-LINE C140	
● Disconnect: In-Line C140. ● Inspect in-line C140 for damage, repair as necessary. ● Measure the resistance between in-line C140 Pin 7, Circuit 70 (LB/WH), harness side and DLC C251 Pin 7, Circuit 70 (LB/WH), harness side.  ● **Is the resistance less than 5 ohms?**	**Yes** REPAIR Circuit 70 (LB/WH) between in-line C140 and anti-lock brake control module C135. TEST the system for normal operation. **No** GO to A11 .
A11 CHECK FOR OPEN BETWEEN THE DLC C251 AND IN-LINE C314	
● Disconnect: In-Line C314. ● Inspect in-line C314 for damage, repair as necessary.	**Yes** REPAIR Circuit 70 (LB/WH)

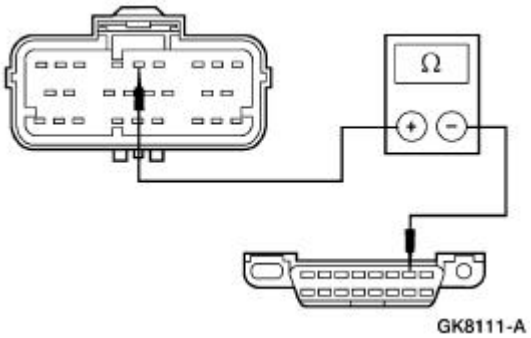
• Measure the resistance between in-line C314 Pin 1, Circuit 70 (LB/WH), harness side and DLC C257 Pin 7, Circuit 70 (LB/WH), harness side.  • **Is the resistance less than 5 ohms?**	between in-line C314 and in-line C140. TEST the system for normal operation. **No** REPAIR Circuit 70 (LB/WH) between in-line C314 and DLC C251. TEST the system for normal operation.

PINPOINT TEST B: THE MODULE DOES NOT RESPOND TO THE DIAGNOSTIC TOOL — GENERIC ELECTRONIC MODULE (GEM)

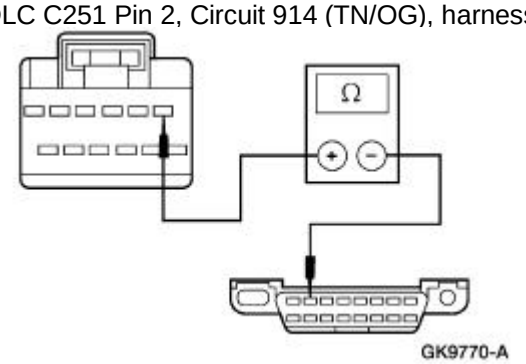
Test Step	Result / Action to Take
B1 CHECK FOR OPEN BETWEEN THE DLC C251 AND GEM C201e	
• Key in OFF position. • Disconnect: GEM C201e. • Inspect GEM C201e for damage, repair as necessary. • Measure the resistance between GEM C201e Pin 6, Circuit 70 (LB/WH), harness side and DLC C251 Pin 7, Circuit 70 (LB/WH), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new GEM. For additional information, REFER to Section 419-10 . TEST the system for normal operation. **No** REPAIR Circuit 70 (LB/WH) between the GEM C201e and DLC C251. TEST the system for normal operation.

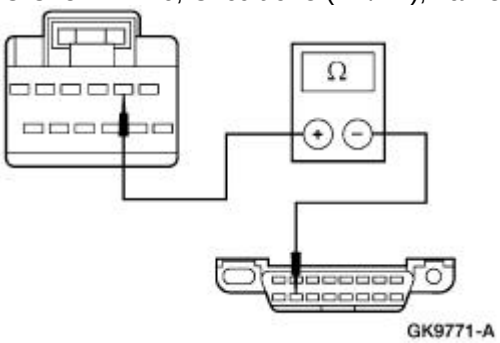
PINPOINT TEST C: THE MODULE DOES NOT RESPOND TO THE DIAGNOSTIC TOOL — RESTRAINT CONTROL MODULE (RCM)

Test Step	Result / Action to Take
C1 CHECK CIRCUIT 70 (LB/WH) FOR OPEN	
• Key in OFF position. • Inspect the DLC C251 and diagnostic tool terminal for damage; repair as necessary. • Deactivate the air bag system. Refer to Section 501-20B . • Disconnect: RCM C2041. • Inspect RCM C2041 for damage, repair as necessary. • Measure the resistance between DLC C251 Pin 7, Circuit 70	**Yes** INSTALL a new RCM. REFER to Section 501-20B . TEST the system for normal operation. **No**

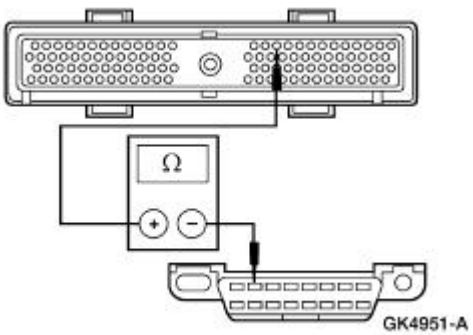
(LB/WH), harness side and RCM C2041 Pin 5, Circuit 70 (LB/WH), harness side.  GK8111-A ● **Is the resistance less than 5 ohms?**	REPAIR Circuit 70 (LB/WH) between RCM C2041 and DLC C251 . TEST the system for normal operation.

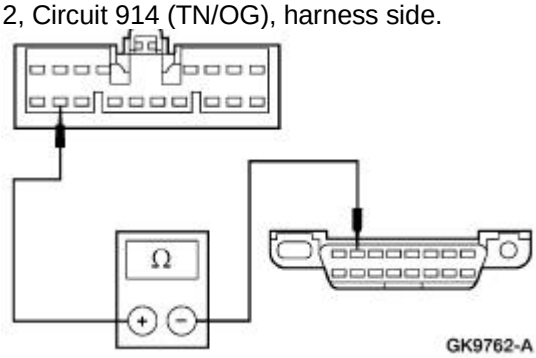
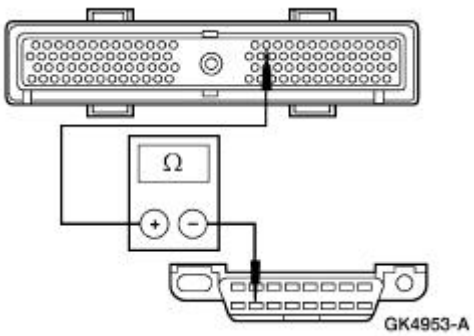
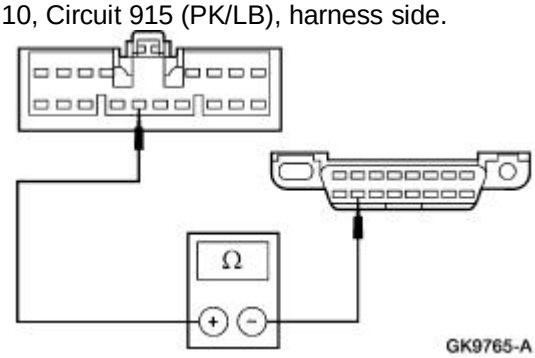
PINPOINT TEST D: THE MODULE DOES NOT RESPOND TO THE DIAGNOSTIC TOOL — INSTRUMENT CLUSTER

Test Step	Result / Action to Take
D1 CHECK INSTRUMENT CLUSTER C220a FOR DAMAGE	
● Key in OFF position. ● Disconnect: Instrument Cluster C220a. ● Inspect instrument cluster C220a for damage; repair as necessary. ● Connect: Instrument Cluster C220a. ● Connect the diagnostic tool. ● Key in ON position. ● Enter the following diagnostic mode on the diagnostic tool: Diagnostic Data Link. ● **Was the result received ICM: NO RESPONSE ON CKT914 (BUS+)?**	**Yes** GO to D2 . **No** GO to D3 .
D2 CHECK FOR OPEN BETWEEN DLC C251 PIN 2 AND INSTRUMENT CLUSTER C220a PIN 1 — CIRCUIT 914 (TN/OG)	
● Key in OFF position. ● Disconnect the diagnostic tool. ● Disconnect: Instrument Cluster C220a. ● Measure the resistance between instrument cluster C220a Pin 1, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.  GK9770-A ● **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new instrument cluster. For additional information, REFER to Section 413-01 . TEST the system for normal operation. **No** REPAIR Circuit 914 (TN/OG) between instrument cluster C220a and DLC C251. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.
D3 CHECK FOR OPEN BETWEEN DLC C251 PIN 10 AND INSTRUMENT CLUSTER C220a PIN 2 — CIRCUIT 915 (PK/LB)	
● Key in OFF position.	**Yes**

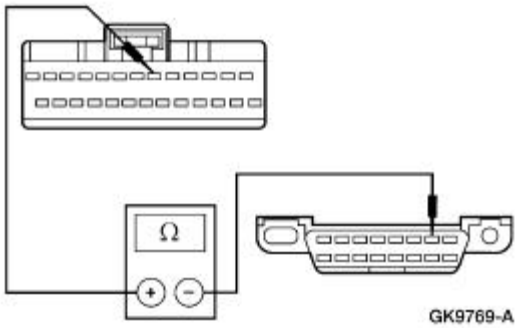
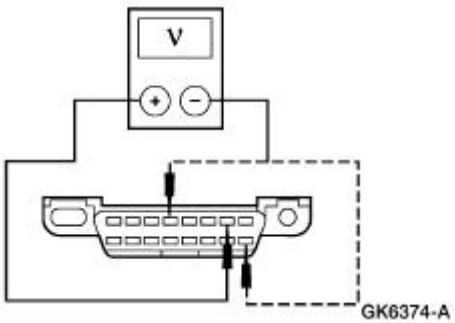
• Disconnect the diagnostic tool. • Measure the resistance between instrument cluster C220a Pin 2, Circuit 915 (PK/LB), harness side and DLC C251 Pin 10, Circuit 915 (PK/LB), harness side.  • **Is the resistance less than 5 ohms?**	INSTALL a new instrument cluster. For additional information, REFER to Section 413-01 . TEST the system for normal operation. **No** REPAIR Circuit 915 (PK/LB) between instrument cluster C220a and DLC C251. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

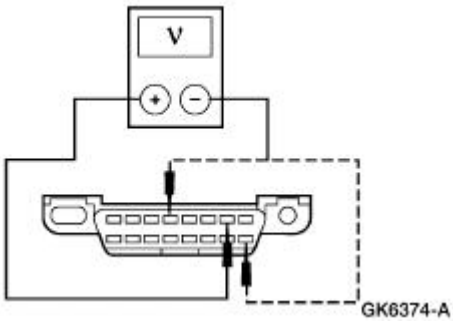
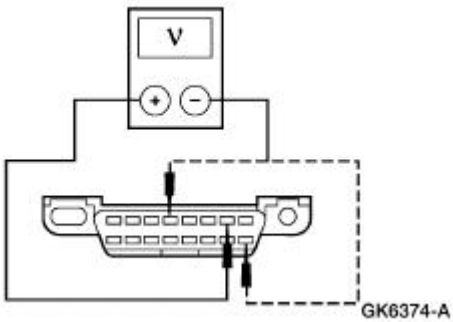
PINPOINT TEST E: THE MODULE DOES NOT RESPOND TO THE DIAGNOSTIC TOOL — POWERTRAIN CONTROL MODULE (PCM)

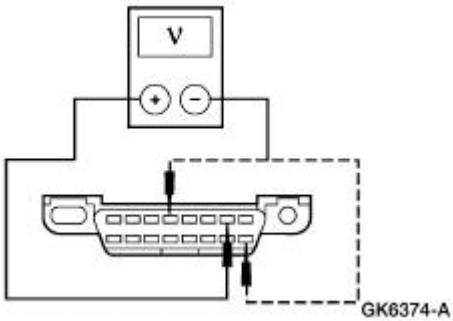
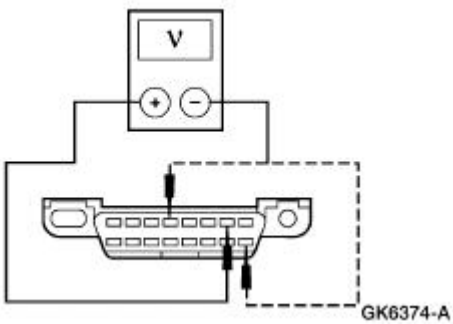
Test Step	Result / Action to Take
E1 CHECK PCM C175 FOR DAMAGE	
• Key in OFF position. • Disconnect: PCM C175. • Inspect PCM C175 for damage; repair as necessary. • Connect: PCM C175. • Connect the diagnostic tool. • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: Diagnostic Data Link. • **Was the result received PCM: NO RESPONSE ON CKT914 (BUS+)?**	**Yes** GO to E2 . **No** GO to E4 .
E2 CHECK FOR OPEN BETWEEN DLC C251 PIN 2 AND PCM C175 PIN 16 — CIRCUIT 914 (TN/OG)	
• Key in OFF position. • Disconnect the diagnostic tool. • Disconnect: PCM C175. • Measure the resistance between PCM C175 Pin 16, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual Section 3. TEST the system for normal operation. **No** GO to E3 .
E3 CHECK CIRCUIT 914 (TN/OG) BETWEEN DLC C251 AND IN-LINE C215 FOR OPEN	
• Disconnect: In-Line C215.	**Yes**

• Check in-line C215 for damage; repair as necessary. • Measure the resistance between in-line C215 Pin 10, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.  • **Is the resistance less than 5 ohms?**	REPAIR Circuit 914 (TN/OG) between PCM C175 and in-line C215. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. **No** REPAIR Circuit 914 (TN/OG) between DLC C251 and in-line C215. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.
E4 CHECK FOR OPEN BETWEEN DLC C251 PIN 10 AND PCM C175 PIN 15 — CIRCUIT 915 (PK/LB)	
• Key in OFF position. • Disconnect the diagnostic tool. • Measure the resistance between PCM C175 Pin 15, Circuit 915 (PK/LB), harness side and DLC C251 Pin 10, Circuit 915 (PK/LB), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual Section 3. TEST the system for normal operation. **No** GO to E5 .
E5 CHECK CIRCUIT 915 (PK/LB) BETWEEN DLC C251 AND IN-LINE C215 FOR OPEN	
• Disconnect: In-Line C215. • Check in-line C215 for damage; repair as necessary. • Measure the resistance between in-line C215 Pin 13, Circuit 915 (PK/LB), harness side and DLC C251 Pin 10, Circuit 915 (PK/LB), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** REPAIR Circuit 915 (PK/LB) between PCM C175 and in-line C215. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. **No** REPAIR Circuit 915 (PK/LB) between DLC C251 and in-line C215. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

PINPOINT TEST F: NO MODULE/NETWORK COMMUNICATION — ISO 9141 COMMUNICATION NETWORK

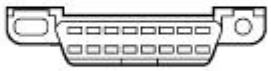
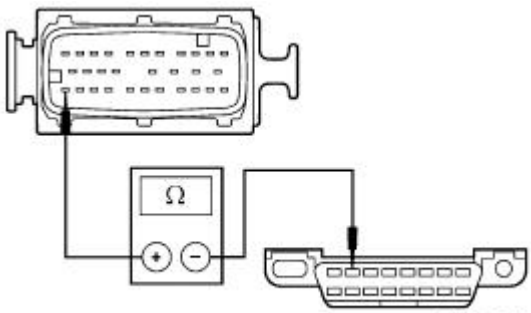
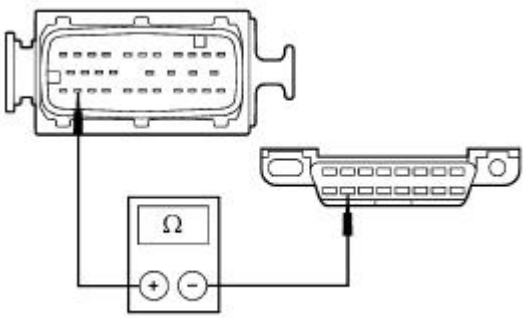
Test Step	Result / Action to Take
F1 CHECK CIRCUIT 70 (LB/WH) FOR OPEN	
• Key in OFF position. • Inspect the DLC C251 Pin 7, Circuit 70 (LB/WH) for damage, repair as necessary. • Disconnect: GEM C201e. • Measure the resistance between GEM C201e Pin 6, Circuit 70 (LB/WH), harness side and DLC C251 Pin 7, Circuit 70 (LB/WH), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** GO to F2 . **No** REPAIR Circuit 70 (LB/WH) between the GEM C201e and DLC C251. TEST the system for normal operation.
F2 CHECK FOR SHORT TO GROUND AND POWER AT DLC C251 — GEM C201e DISCONNECTED	
• Key in ON position. • Measure the voltage between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  • **Is the voltage indicated in either measurement zero volts?**	**Yes** CONNECT the GEM module C201e. GO to F3 . **No** INSTALL a new GEM. For additional information, REFER to Section 419-10 . TEST the system for normal operation.
F3 CHECK FOR SHORT TO GROUND AND POWER AT DLC C251 — IN-LINE C314 DISCONNECTED	
• Key in OFF position. • Disconnect: In-Line C314. • Key in ON position. • Measure the voltage between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.	**Yes** GO to F4 . **No** GO to F5 .

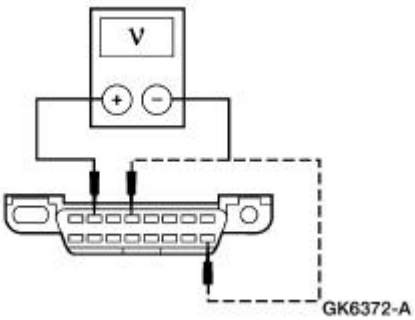
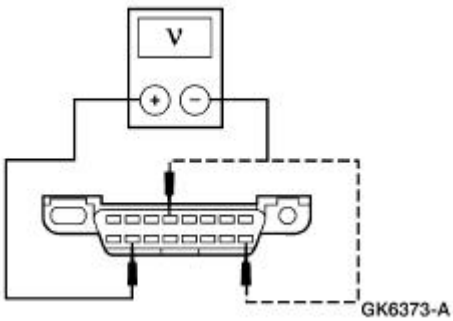
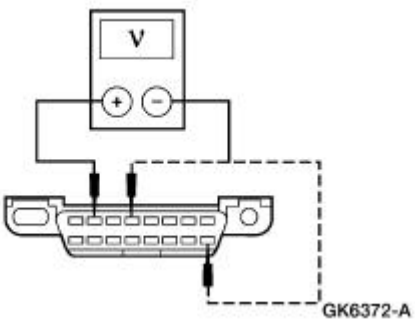
 ● **Is the voltage indicated in either measurement zero volts?**	
F4 CHECK FOR SHORT TO GROUND AND POWER AT DLC C251 — RCM C2041 DISCONNECTED	
● Key in OFF position. ● Deactivate the air bag system; REFER to Section 501-20B . ● Disconnect: RCM C2041. ● Key in ON position. ● Measure the voltage between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  ● **Is the voltage indicated in either measurement zero volts?**	**Yes** REPAIR Circuit 70 (LB/WH) between DLC C251, GEM C201e, RCM C2041, and in-line C314. TEST the system for normal operation. **No** INSTALL a new RCM. REFER to Section 501-20B . TEST the system for normal operation.
F5 CHECK FOR THE ANTI-LOCK BRAKE CONTROL MODULE	
● Key in OFF position. ● Connect: In-Line C3141. ● Check the vehicle for any version of the anti-lock brake control module. ● **Is the vehicle equipped with any version of the anti-lock brake control module (with or without traction control)?**	**Yes** GO to F6 . **No** GO to F7 .
F6 CHECK FOR SHORT TO GROUND AND POWER AT DLC C251 — ANTI-LOCK BRAKE CONTROL MODULE C135 DISCONNECTED	
● Disconnect: Anti-Lock Brake Control Module C135. ● Key in ON position. ● Measure the voltage between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.	**Yes** GO to F7 . **No** INSTALL a new anti-lock brake control module. For additional information on the anti-lock brake control module without traction control, REFER to

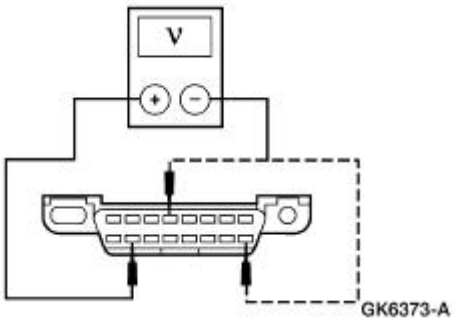
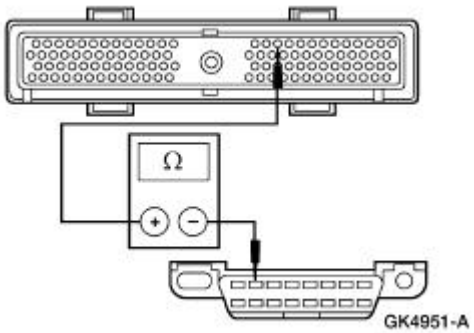
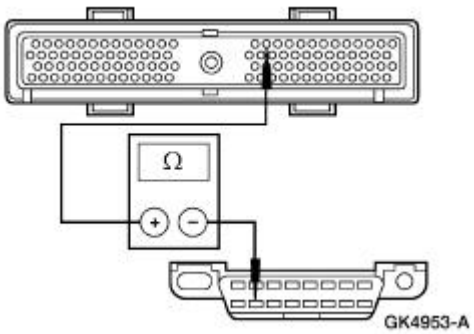
 GK6374-A ● **Is the voltage indicated in either measurement zero volts?**	Section 206-09A . For additional information on the anti-lock brake control module with traction control, REFER to Section 206-09B . TEST the system for normal operation.
F7 CHECK FOR SHORT TO GROUND AND POWER AT DLC C251 — IN-LINE C140 DISCONNECTED	
● Key in OFF position. ● Disconnect: In-Line C140. ● Key in ON position. ● Measure the voltage between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 7, Circuit 70 (LB/WH), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  GK6374-A ● **Is the voltage indicated in either measurement zero volts?**	**Yes** REPAIR Circuit 70 (LB/WH) between in-line C314 and in-line C140. TEST the system for normal operation. **No** REPAIR Circuit 70 (LB/WH) between in-line C140 and the anti-lock brake control module C135. TEST the system for normal operation.

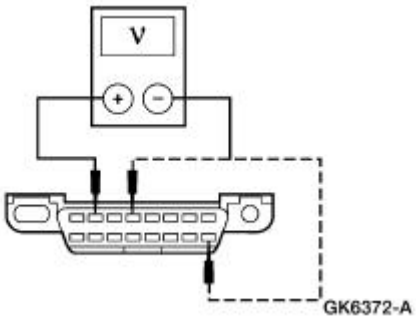
PINPOINT TEST G: NO MODULE/NETWORK COMMUNICATION — SCP NETWORK

Test Step	Result / Action to Take
G1 CHECK DIAGNOSTIC TOOL PINS FOR DAMAGE	
● Inspect diagnostic tool pins for damage. GK2632-A ● **Are the diagnostic tool pins OK?**	**Yes** GO to G2 . **No** REPAIR the diagnostic tool terminals. TEST the system for normal operation.

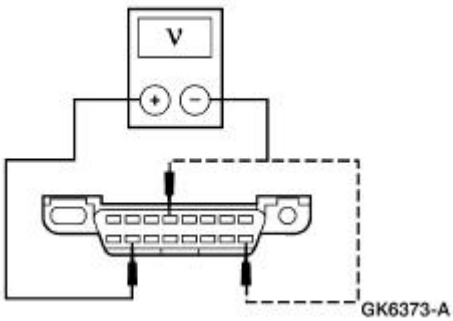
G2 CHECK DLC C251 PINS 2 AND 10 FOR DAMAGE	
• Key in OFF position. • Inspect the DLC C251 pins for damage.  GK2633-A • **Are the pins OK?**	**Yes** GO to G3 . **No** REPAIR the DLC C251. TEST the system for normal operation.
G3 CHECK THE VEHICLE FOR THE ANTI-LOCK BRAKE CONTROL MODULE	
• Check the vehicle for any version of the anti-lock brake control module. • **Is the vehicle equipped with any version of the anti-lock brake control module (with or without traction control)?**	**Yes** GO to G4 . **No** GO to G7 .
G4 CHECK CIRCUIT 914 (TN/OG) AND CIRCUIT 915 (PK/LB) FOR OPEN — ANTI-LOCK BRAKE CONTROL MODULE C135 DISCONNECTED	
• Disconnect: Anti-Lock Brake Control Module C135. • Measure the resistance between anti-lock brake control module C135 Pin 30, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.  GK9760-A • Measure the resistance between anti-lock brake control module C135 Pin 29, Circuit 915 (PK/LB), harness side and DLC C251 Pin 10, Circuit 915 (PK/LB), harness side.  GK9763-A • **Are the resistances less than 5 ohms?**	**Yes** GO to G5 . **No** REPAIR the circuit(s) in question between in-line C215 and DLC C251. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.
G5 CHECK CIRCUIT 914 (TN/OG) AND CIRCUIT 915	

(PK/LB) FOR THE SOURCE OF THE CONCERN — ANTI-LOCK BRAKE CONTROL MODULE C135 DISCONNECTED	
• Key in ON position. • Measure the voltage between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  GK6372-A • Measure the voltage between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  GK6373-A • **Is the voltage zero volts for any measurement?**	**Yes** GO to G6 . **No** INSTALL a new anti-lock brake control module. For additional information on the anti-lock brake control module without traction control, REFER to Section 206-09A . For additional information on the anti-lock brake control module with traction control, REFER to Section 206-09B . TEST the system for normal operation.
G6 CHECK CIRCUIT 914 (TN/OG) AND CIRCUIT 915 (PK/LB) FOR THE SOURCE OF THE CONCERN — IN-LINE C144 DISCONNECTED	
• Key in OFF position. • Disconnect: In-Line C144. • Key in ON position. • Measure the voltage between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  GK6372-A • Measure the voltage between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 4,	**Yes** GO to G8 . **No** REPAIR the circuit(s) in question between in-line C144 and the anti-lock brake control module C135. REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

Circuit 1205 (BK); and between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  GK6373-A • **Is the voltage zero volts for any measurement?**	
G7 CHECK CIRCUIT 914 (TN/OG) AND CIRCUIT 915 (PK/LB) FOR OPEN — PCM C175 DISCONNECTED	
• Disconnect: PCM C175. • Measure the resistance between PCM C175 Pin 16, Circuit 914 (TN/OG), harness side and DLC C251 Pin 2, Circuit 914 (TN/OG), harness side.  GK4951-A • Measure the resistance between PCM C175 Pin 15, Circuit 915 (PK/LB), harness side and DLC C251 Pin 10, Circuit 915 (PK/LB), harness side.  GK4953-A • **Are the resistances less than 5 ohms?**	**Yes** GO to G8 . **No** REPAIR the circuit(s) in question between in-line C215 and DLC C251. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.
G8 CHECK CIRCUIT 914 (TN/OG) AND CIRCUIT 915 (PK/LB) FOR THE SOURCE OF THE CONCERN — PCM C175 DISCONNECTED	
• Key in OFF position. • Disconnect: PCM C175. • Key in ON position. • Measure the voltage between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.	**Yes** GO to G9 . **No** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual Section 3 for diagnosis and testing.



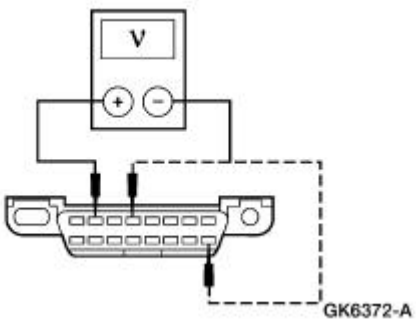
- Measure the voltage between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.



- **Is the voltage zero volts for any measurement?**

G9 CHECK CIRCUIT 914 (TN/OG) AND CIRCUIT 915 (PK/LB) FOR THE SOURCE OF THE CONCERN — IN-LINE C215 DISCONNECTED

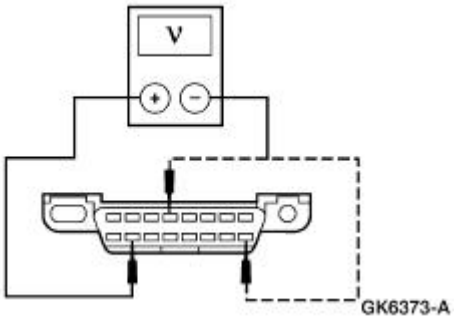
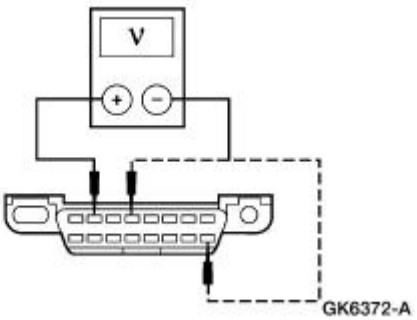
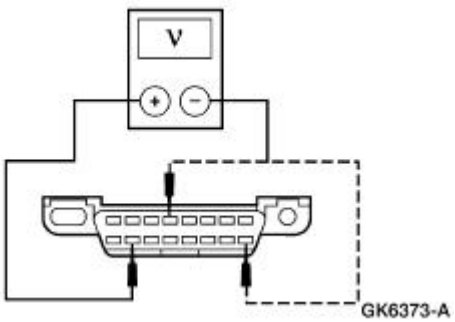
- Key in OFF position.
- Disconnect: In-Line C215.
- Key in ON position.
- Measure the voltage between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.



- Measure the voltage between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.

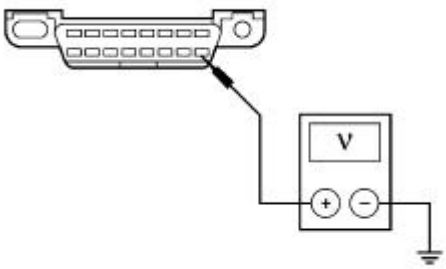
Yes
GO to G10 .

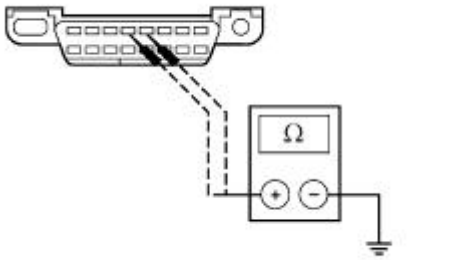
No
REPAIR the circuit(s) in question between in-line C215, in -line C144 (if equipped with the anti-lock brake control module), and the PCM C175. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

 ● **Is the voltage zero volts for any measurement?**	
G10 CHECK CIRCUIT 914 (TN/OG) AND CIRCUIT 915 (PK/LB) FOR THE SOURCE OF THE CONCERN — INSTRUMENT CLUSTER C220a DISCONNECTED	
● Key in OFF position. ● Disconnect: Instrument Cluster C220a. ● Key in ON position. ● Measure the voltage between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 2, Circuit 914 (TN/OG), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  ● Measure the voltage between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 4, Circuit 1205 (BK); and between DLC C251 Pin 10, Circuit 915 (PK/LB), harness side and C251 Pin 16, Circuit 1047 (LG/RD), harness side.  ● **Is the voltage zero volts for any measurement?**	**Yes** REPAIR the circuit(s) in question between in-line C215, DLC C251, and the instrument cluster C220a. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. **No** INSTALL a new instrument cluster. For additional information, REFER to Section 413-01 . TEST the system for normal operation.

PINPOINT TEST H: NO MODULE / NETWORK COMMUNICATION — NO POWER TO THE DIAGNOSTIC TOOL

Test Step	Result / Action to Take

H1 CHECK DIAGNOSTIC TOOL PINS FOR DAMAGE	
• Inspect diagnostic tool pins. GK2632-A • **Are the pins OK?**	**Yes** GO to H2 . **No** REPAIR diagnostic tool pins. TEST the system for normal operation.
H2 CHECK DLC C251 FOR DAMAGE	
• Key in OFF position. • Inspect the DLC C251 pins for damage. GK2633-A • **Are the pins OK?**	**Yes** GO to H3 . **No** REPAIR DLC C251. TEST the system for normal operation.
H3 CHECK VOLTAGE TO DLC C251 PIN 16 — CIRCUIT 1047 (LG/RD)	
• Measure the voltage between DLC C251 Pin 16, Circuit 1047 (LG/RD), harness side and ground.  GK2634-A • **Is the voltage greater than 10 volts?**	**Yes** GO to H4 . **No** REPAIR Circuit 1047 (LG/RD). TEST the system for normal operation.
H4 CHECK THE DLC GROUND — CIRCUIT 1205 (BK) AND CIRCUIT 651 (BK/YE)	
• Measure the resistance between DLC C251 Pin 4, Circuit 1205 (BK), harness side and ground; and between DLC C251 Pin 5, Circuit 651 (BK/YE), harness side and ground.	**Yes** CHECK diagnostic tool. TEST the system for normal operation. **No** REPAIR the circuit in question. TEST the system for normal operation.



GK4963-A

- **Is the resistance less than 5 ohms?**

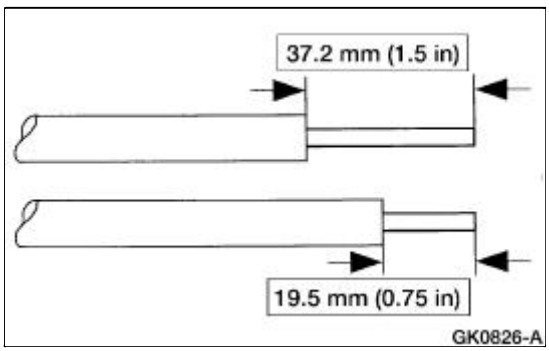
Communication Circuit Wiring Repair

Special Tool(s)

ST1171-A	Heat Gun 107-R0300 or equivalent

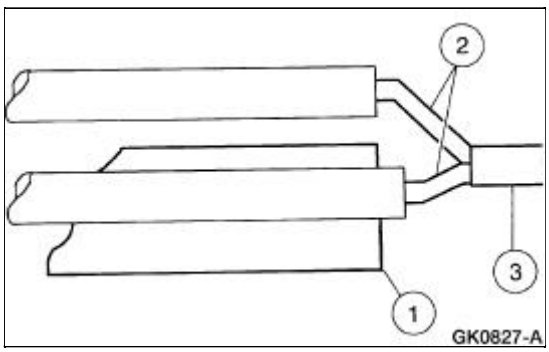
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01.

2. Strip the wires.



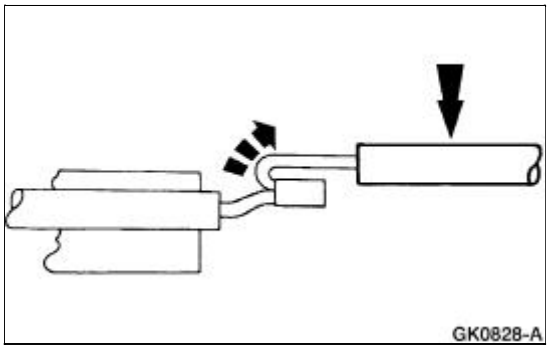
3. **NOTE:** Use rosin core mildly activated (RMA) solder, not acid core solder.

   Solder the wires.
   1. Install the heat shrink tube.
   2. Twist the wires together.
   3. Solder the wires together.

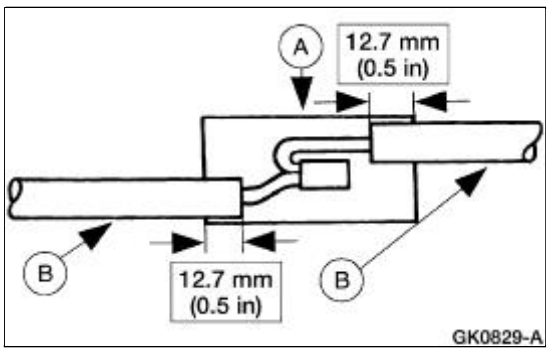


4. **NOTE:** Wait for the solder to cool before moving the wires.

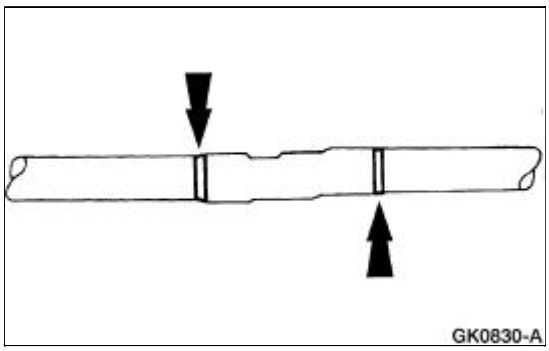
   Bend the wires back in a straight line.



5. Position the (A) heat shrink tube over the (B) wire repair.
    - Overlap the heat shrink tube on both wires.



6. Use the heat gun to heat the repaired area until adhesive flows out both ends of the heat shrink tube.



7. Reconnect the battery ground cable.

Module Configuration

Special Tool(s)

ST2332-A	Worldwide Diagnostic System (WDS) 418-F224 New Generation STAR (NGS) Tester 418-F052 or equivalent diagnostic tool

Principles of Operation

Some modules must be programmed as part of the repair procedure. If this procedure is not followed the module will not function correctly and may set a number of DTCs, including B2477 or P1639, which indicate that some necessary data has not been programmed into the module.

Modules that need programming should not be exchanged between vehicles. In most cases the parameter values or settings are unique to that vehicle, and if not set correctly will cause concerns or faults.

Some programmable parameters, such as belt minder on/off, can be changed from the factory setting at the customer's request.

WDS will automatically attempt to retrieve the module configuration information from all modules, and from a backup location in the powertrain control module (PCM) when vehicle ID is carried out. If the module and the PCM do not contain correct information the diagnostic tool will either request "As Built" data or display a list of items that you will need to manually configure. The diagnostic tool will program the module based on the data you enter.

There are three different methods that are used for module programming:

- programmable module installation (PMI)
- calibration update
- programmable parameters

Some modules do not support all three methods.

Programmable Module Installation (PMI)

The programmable module installation (PMI) method is used when a new programmable module is installed on the vehicle. It is no longer necessary to command the diagnostic tool to gather module option content from the old module. The diagnostic tool automatically obtains any available module option content information from the old module during the vehicle ID routine that runs when the diagnostic tool is initially connected to the vehicle. It is important that you connect WDS to the vehicle and allow it to identify the vehicle and obtain configuration data prior to removing any modules.

Calibration Update

Calibration update is used to install a new calibration and strategy into a module. The updates are usually issued to fix a concern in the module software and would normally be addressed by a technical service bulletin (TSB). This method has been used by the PCM for several years. Other modules will be adopting this strategy as well.

Programmable Parameters

This method is used to configure parameters that can be modified in service. These are typically at the preference of the customer. Not all features controlled by the module are listed in this configuration method. Refer to the Module Configuration Index for a list of features by system.

If a module that has been modified using programmable parameters needs to be installed, the PMI procedure will maintain the parameters in their altered state if WDS is able to communicate with the old module during Vehicle ID. Otherwise you may need to use programmable parameters to return them to the altered state.

Vehicle Identification (VID) Block

Some PCMs contain a memory area called a vehicle identification (VID) block. The VID block is used to store backup data for each programmable module, as well as, powertrain configuration information.

If the diagnostic tool cannot retrieve module option content information from the suspect module, the diagnostic tool will attempt to extract backup information from the PCM's VID block.

The PCM VID block contains the factory settings for the configurable modules unless the PCM is flashed with a new calibration, in which case some PCM parameters may be modified.

As-Built Data Center

The As-Built Data Center maintains a record of the vehicle configuration in a database. The vehicle's VIN is required to obtain this information. The As-Built Data Center records the applicable module configurations stored in each module before the vehicle leaves the factory. The As-Built Data Center will always reflect the original build of the vehicle as it left the factory. Only contact the As-Built Data Center when directed to do so by the diagnostic tool.

Inspection and Verification

1. Visually inspect for obvious signs of electrical damage. Refer to the following chart:

Visual Inspection Chart

Electrical
• Wiring harness • Connectors

Configurable Modules

The vehicle contains the following modules that are configurable:

- generic electronic module (GEM)

Programmable Parameters Index

System	Programmable Parameter Items
Warnings & Chimes	Belt Minder